Our Solar System Through the Eyes of Scientists
Grades 1–3 Lesson 2 (Activities 1–5)

LESSON 2

So — What Is a Planet?

Activity 1 — Pre-Assessment

Activity Time
45 minutes

Picture This!

Introduction for Teachers

The sky is like a huge treasure map. The Sun, the eight planets, galaxies, stars… all around us when we look up into the sky are mysterious and wonderful things that scientists want to explore, like pirates searching for treasure. Meet Dr. Phil Chamberlin, Scientist and Treasure Hunter at NASA's Goddard Space Flight Center. Learn about Dr. Chamberlin, and his study of the brightest and nearest star to us — the Sun. Learn what scientists do as they explore the ever-changing, ever-moving solar system and the planets themselves. What do your students know and wonder about the solar system and the planets? Your students can literally get their hands on the solar system by creating their own model of the planets out of clay and styrofoam. You can teach your students about the nature of each planet, including their shapes and sizes. Introduce math concepts that help sort, classify, and number the planets. Your students will learn to think like scientists, using notebooks to write and draw and ask new questions about what they see.

Come In!

What is a planet? How many planets are there in our solar system? Are we in the solar system? Yes! We are on planet Earth, moving around the Sun with all the other planets.

Intended Curriculum

Big Idea

- Learning about the Sun and the planets as a "treasure map" through the eyes of Scientist–Treasure Hunter, Dr. Phil Chamberlin.

Science Objectives

Students will:

- Meet Dr. Phil Chamberlin and learn about his work and his love of space, which began when he was a boy.
- Learn that there are eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- Learn that the planets are spheres.
- Learn that the planets orbit the Sun in an almost circular motion.
- Learn that the four planets closest to the Sun are small and rocky and the four outermost planets are large and made mostly of gas.
- Make and use a model to learn about the planets and use the model to gain information like scientists do.

Language Arts Objectives

Students will:

- Write, draw and report what they have learned about the planets in the solar system. Students will also use scientific language to accurately record observations.
- Reflect on their knowledge and document learning through compare and contrast writing.

Math Objectives

Students will:

- Write mathematical sentences using comparative symbols and practice addition.

Materials and Teacher Preparation

Materials

- "Meet the Scientist" segment below
- Colored pencils or crayons
- Pencils
- Science Notebooks
- Solar System Folder for each student
- Science Word Wall Chart
- "What Scientists Do" wall chart

Teacher Preparation

- Distribute a Science Notebook and Solar System Folder for each student.
- Hang the Science Word Wall and the "What Scientists Do" charts.
- Create evaluation rubrics (see teacher pre-assessment evaluation guidelines).

Meet the Scientist

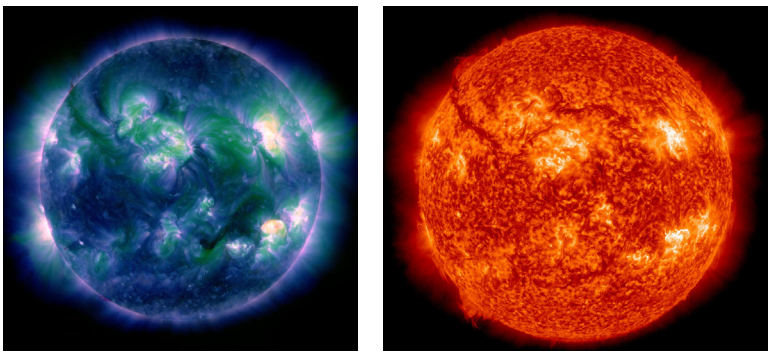
The Story Begins! Meet Dr. Phil Chamberlin

The sky is like a huge treasure map. The Sun, the eight planets, galaxies, stars… When we look up into the sky there are so many mysterious and wonderful things that scientists want to explore, like pirates searching for treasure. Meet Dr. Phil Chamberlin, Research Astrophysicist, Scientist, Engineer and Treasure Hunter at NASA's Goddard Space Flight Center, in Greenbelt, Maryland.

"The Sun, the planets, rockets — I like it all, as long as it involves space!" says Dr. Chamberlin. He studied math, science and engineering in college. That's a lot to study!

Dr. Chamberlin became interested in space when he was just your age. He went camping with his dad. His dad is a geologist who studies rocks and mountains that we find here on our very own planet Earth. Dr. Chamberlin loves planet Earth, but he is really interested in the Sun. Like a pirate searching for gold, Dr. Chamberlin spends a lot of time exploring his own type of "gold"— the light of the Sun.

He works with a team of people on the Solar Dynamics Observatory (SDO), designed to help us understand how the Sun influences our home planet, Earth. SDO launched into space in February 2010 to hunt for treasure — in this case, a look at the Sun. The Sun, our closest star, is still a great mystery to scientists. SDO will help us understand where the Sun's



These are two views of our Sun as seen by the Solar Dynamics Observatory.

energy comes from and how the inside of the Sun works. By better understanding the Sun and how it works, we will be able to better predict and better forecast "space weather" by providing earlier warnings to protect our astronauts and satellites floating around out there. Dr. Chamberlin is interested in solar flares — huge eruptions on the Sun that are very mysterious. Why do they happen? How do they affect us on Earth? The treasure hunt continues.

Discussion Prompt

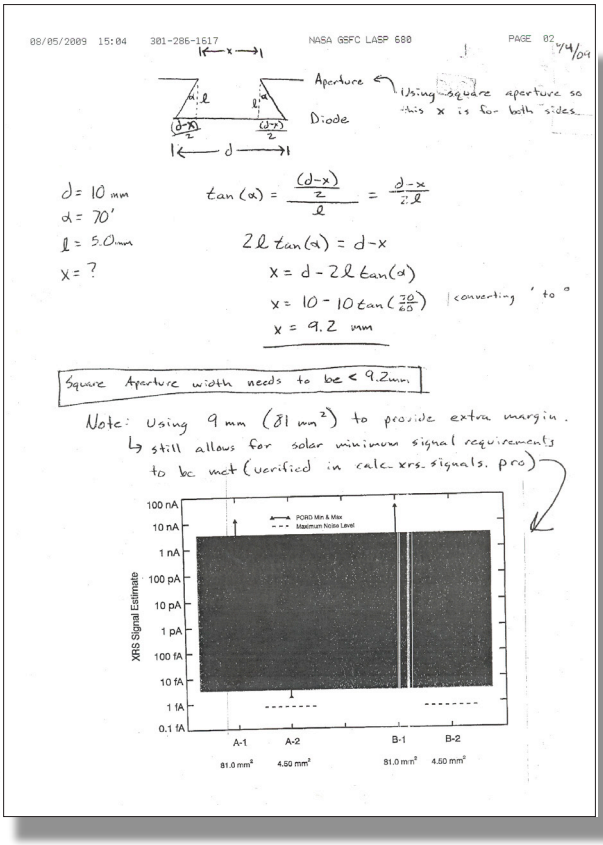
- What do you think about the Sun? What do you think about the other planets?
- How do you think Dr. Chamberlin studies the planets and the Sun?
- Let's talk about where you see the Sun and all the other planets in the solar system.
- What types of treasure would you like to find in space?

Science Notebooks

Let's Begin Our Notebook Activity

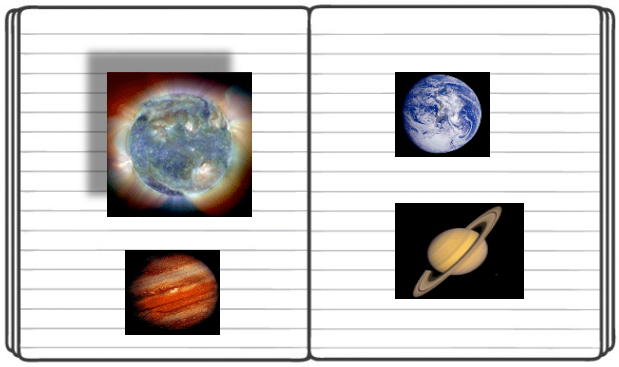
Science notebooks are really important to being a good scientist, because they help you remember what you see and observe, and what you want to know. As you learn new things, you can add them to your notebook.

As Dr. Phil Chamberlin says, "Yes, I keep a notebook! This is a very important thing to do as a scientist. I have been working on one instrument on SDO called the EUV Variability Experiment (EVE) for about 6 years now, and I can't even tell you how many times I look back at my notes. I have forgotten how to do many of the things that were done early in the development of this instrument, and am constantly going back to these notebooks to "re-learn" or remind myself how to do things, or study the reasoning behind a decision that was made 5 years ago!



This is a page from Dr. Chamberlin's notebook.

- When you think about the Sun and the planets, what do you see? Think like a scientist and draw and label what you think you know about the Sun, the planets and the solar system.
- What do you think a scientist/engineer like Dr. Chamberlin might put in his notebook?
- Include drawings and illustrations.



Making Meaning

What have you learned?
Direct students to identify all eight planets and the Sun, and draw them in their notebooks.

Some facts to emphasize:

- The names of the planets.
- Planets orbit around the Sun.
- Planets are spheres.
- The orbits of planets look a lot like circles and the planets orbit counterclockwise around the Sun.
- Planets vary in size and what they are made of — the four smaller ones are mostly rock and the four big ones are mostly gas.
- Planets pull at nearby objects with a force called gravity.
- Science changes all the time. What we know and what Dr. Chamberlain knows changes as we learn more about the treasure map of our solar system.

Using the notebooks, ask students to share their words, pictures, ideas, phrases, and sentences.

Have students label what they draw in their notebooks.

Refer to the "What Scientists Do" chart: How did this activity help your students think and be like scientists? Compare and contrast the chart with the students' observations, recording, notebook and discussion activities.

Science Word Wall

These are words placed to get the students to start thinking about these concepts. As they learn more about the planets, the Sun, and the solar system, encourage students to add their own.

First Words for the Science Word Wall

sphere, scientist, engineer, definition, planets, irregular, measurement, Sun, comet, asteroid, counterclockwise, opposite, rocky planet, equation, equal to, greater than, less than

Teacher Pre-Assessment Evaluation

Objectives taught in this lesson may be used to create rubrics for evaluating student writing in notebooks and represent the pre-assessment for this unit.

Students will:

- Meet Dr. Phil Chamberlin and learn about his work and his love of space
- Learn that there are eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune
- Learn that the planets are spheres
- Learn that the planets orbit the Sun in an almost circular motion
- Learn that the four planets closest to the Sun are small and rocky and the four outermost planets are large and made mostly of gas
- Make and use a model to learn about the planets and use the model to gain information like scientists do
- Reflect on their knowledge and document learning through compare and contrast writing

Standards

National Science Standards

- Physical Science: position and motion of objects
- Earth and Space Science: objects in the sky

National Council of Teachers of English (NCTE) Standards for the English Language Arts

- Students read a wide range of print and non-print text to build an understanding of nonfiction texts and to acquire new information.
- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts.
- Students adjust their use of spoken, written and visual language to communicate effectively with a variety of audiences and for different purposes.
- Students employ a wide range of strategies as they write and communicate with different audiences for a variety of purposes.
- Students conduct research by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data to communicate their discoveries.
- Students use spoken, written, and visual language to accomplish their own purposes for learning, enjoyment, persuasion and the exchange of information.

National Mathematics Standards

- Basic algebra: sort, classify, and order objects by size, number and other properties

Acknowledgments

Dr. Phil Chamberlin, NASA's Goddard Space Flight Center (GSFC) —
http://www.nasa.gov/centers/goddard/home/index.html

Solar Dynamics Observatory —
http://sdo.gsfc.nasa.gov/

University of California, Berkeley, Center for Science Education —
http://cse.ssl.berkeley.edu/cms/

Christopher Slaughter, Science Educator

Lehn, Barbara, *What Is a Scientist?* Connecticut: Millbrook Press, 1998. Illustrated with photographs by Carol Krauss. This engaging book demonstrates what a scientist is by equating the hands-on, investigative curiosity of first-grade students with the scientific method of inquiry. Colorful photographs of the children at work employ a multicultural collection of real students as models.

Further Exploration

Two great NASA websites to start your own exploration of the solar system:

http://www.jpl.nasa.gov/solar-system/index.cfm
http://solarsystem.nasa.gov/index.cfm

Another NASA site with interactives and lots of useful information for background building and classroom use:
http://nasascience.nasa.gov/kids/kids-solar-system

NASA Space Place: "Why Do Planets Go Around the Sun?"
http://spaceplace.nasa.gov/en/kids/phonedrmarc/2002_july.shtml

"WHAT SCIENTISTS DO" CHART

What do I do that is like Dr. Phil Chamberlin?

Predictions About What Scientists Do	What Scientists Do	How We Were Like Scientists
Find answers	Often work in groups	Worked in groups
Work in labs	Ask questions	Collected data, wrote in notebooks
Invent things	Read other scientists' work	Used evidence to discuss what we saw
Mix things together	When they disagree, they look for more evidence	Discussed observations and read books by other scientists

LESSON 2

So — What Is a Planet?

Activity 2 — Try This!

Activity Time
60 minutes

Get Your Hands on the Solar System!

Let's make a model of the Sun and the planets in our solar system! What do the planets look like? Students can make a hands-on model of the planets using Styrofoam and clay (or Play-Dough).

Share with Class

Dr. Phil Chamberlin loved everything about space (planets, the Sun, galaxies, stars, etc.) while growing up. He knew he wanted to do something professionally that had anything to do with studying space in a scientific way. He also really loved doing hands-on things, so he knew he wanted to build rockets to send spacecraft to study the Sun.

Intended Curriculum

Big Idea

Learning about the Sun and the planets as a "treasure map" through the eyes of Scientist–Treasure Hunte, Dr. Phil Chamberlin..

Science Objectives

Students will:

- Learn the names of the planets.
- Learn that the planets are spheres.
- Learn that the four planets closest to the Sun are small and rocky and the four outermost planets are large and made mostly of gas.
- Make a model and use it as a scientific tool to gain information.

Language Arts Objectives

Students will:

- Discuss the similarities and differences between the planets and a model of the planets.
- Use accurate language to orally communicate their scientific understanding.

Materials and Teacher Preparation

Materials

- Planet Comparison Chart (in black and white so students can glue the models of the planets onto the paper found in the Resource Material section)
- Colored pencils or crayons
- Science Notebooks
- Science Word Wall Chart
- "Make-It-Yourself" Play Dough, commercial Play-Doh, or clay
- Styrofoam balls for each student pair (one 2½-inch ball for Jupiter; one 2-inch ball for Saturn; and two ¾-inch balls for Neptune and Uranus). The styrofoam balls can be found in arts/crafts sections of stores.
- Small baggies
- White or Tacky glue
- Watercolors and brushes

Teacher Preparation

Make copies of the Planet Comparison Chart and have other materials ready.

Teacher Tip: Directions for "Make-It-Yourself" Play Dough

- 1 cup flour
- 1 T. vegetable oil
- ¼ cup salt
- 2 T. cream of tartar
- 1 cup water
- Food coloring (yellow, blue and red)

Mix flour, salt and cream of tartar together in a small cooking pot. Add the oil and water to the dry mixture. Cook on low heat and continue stirring until mixture gels. Cool slightly and form three balls: color one yellow, one blue and one red. Store in baggies until ready to use.
NOTE: If you are buying Play-Doh — get red, blue and yellow in very small containers.

Lesson Procedure

- Hand out Planet Comparison Chart (see Resource Material) for every pair of students. Have ready Play Dough or clay and styrofoam balls. Have other materials ready.
- Pass out 1 baggie containing 4 styrofoam balls along with watercolor supplies to each student pair. Tell them the balls represent the four gas planets in their models of the solar system. Ask students to name each of the planets represented by the styrofoam balls.
- Guide students (using the information below) in their painting of the giant gas planets.
- Set planets at the top of the desk to dry.
- Have students roll the dough into small spheres representing the rocky planets. Refer to the color chart and ask students to name each of them. Glue down the dough or clay rocky planets on the chart.
- Once they are dry, glue your painted styrofoam planets on the worksheet.
- Explain to your students that the model shows relative sizes of the planets, not their distance from each other or from the Sun.
- When everything has dried, you can hang your students' lightweight models on bulletin boards.

Discussion Prompt

- Compare and contrast the model to the planets in the chart. How are they alike? How are they different?
- How might Dr. Chamberlin make a model of the Sun? Refer to Solar Flare model (see Resource Materials) for more information about what Dr. Chamberlin studies.
- Were you surprised by the different sizes of the planets?

Science Notebooks

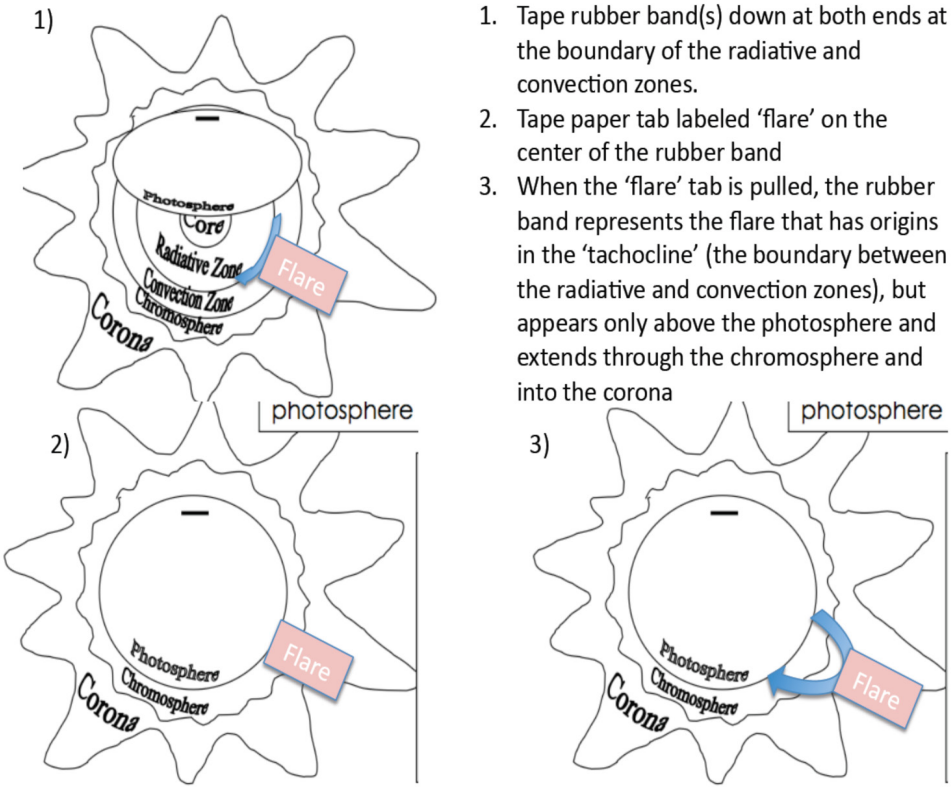
Let's Begin Our Notebook Activity

What do you know about the planets?

- Now that you can see and touch the Sun and the planets in the model, what do you think about their different sizes? What do they feel like? How are they different from each other? What are their shapes? In your notebook, write down what you see on the model.
- Have students share their maps and also share what words, phrases, sentences and pictures they use to describe the map in their notebooks.

Now, let's take a look at our Sun —

- The Sun is the only star in our solar system. As Dr. Chamberlin sees it, the Sun is important to study, so we can learn how the planets formed, including Earth!
- The Sun is a bubbling, boiling ball of fire. It constantly belches out great clouds of hot gas. This gas is all charged up with electricity. This stuff travels at astounding speeds, some of it right toward Earth! Sometimes the Sun gets extra restless. It has "solar indigestion!" These sudden and intense hiccups and burps are called solar flares and coronal mass ejections (CMEs). Take a look at a model of how a solar flare works, from the Chabot Space and Science Center in Oakland, California. This is one serious treasure hunt for Dr. Chamberlin!



1. Tape rubber band(s) down at both ends at the boundary of the radiative and convection zones.
2. Tape paper tab labeled 'flare' on the center of the rubber band
3. When the 'flare' tab is pulled, the rubber band represents the flare that has origins in the 'tachocline' (the boundary between the radiative and convection zones), but appears only above the photosphere and extends through the chromosphere and into the corona

Science Word Wall

map, size, shape, model, compare, contrast

Making Meaning

Have students refer to their notebooks.

How would a scientist like Dr. Chamberlin use a model to plan his treasure hunt? The important thing to remember is that scientists like Dr. Chamberlin rely on models to study the planets and the Sun to be able to find the best way to hunt for the best treasures in our solar system.

Refer to the solar flare model from Chabot Space and Science Center (see Resource Materials) for information about how Dr. Chamberlin might use this model to get information about solar flares.

How would you use a model to get information?

Have students share their notebooks and the words, phrases, sentences and pictures they use to describe the planets in their notebooks.

Acknowledgments

Dr. Phil Chamberlin, NASA's Goddard Space Flight Center — *http://www.nasa.gov/centers/goddard/home/index.html*

Chabot Space and Science Center — *http://www.chabotspace.org/*

Further Exploration

NASA's Solar System Exploration website (all about planets) — *http://solarsystem.nasa.gov/planets/index.cfm*

NASA's "What Is a Planet?" — *http:// www.nasa.gov/audience/foreducators/topnav/materials/listbytype/What_Is_a_Planet_Lithograph.html*

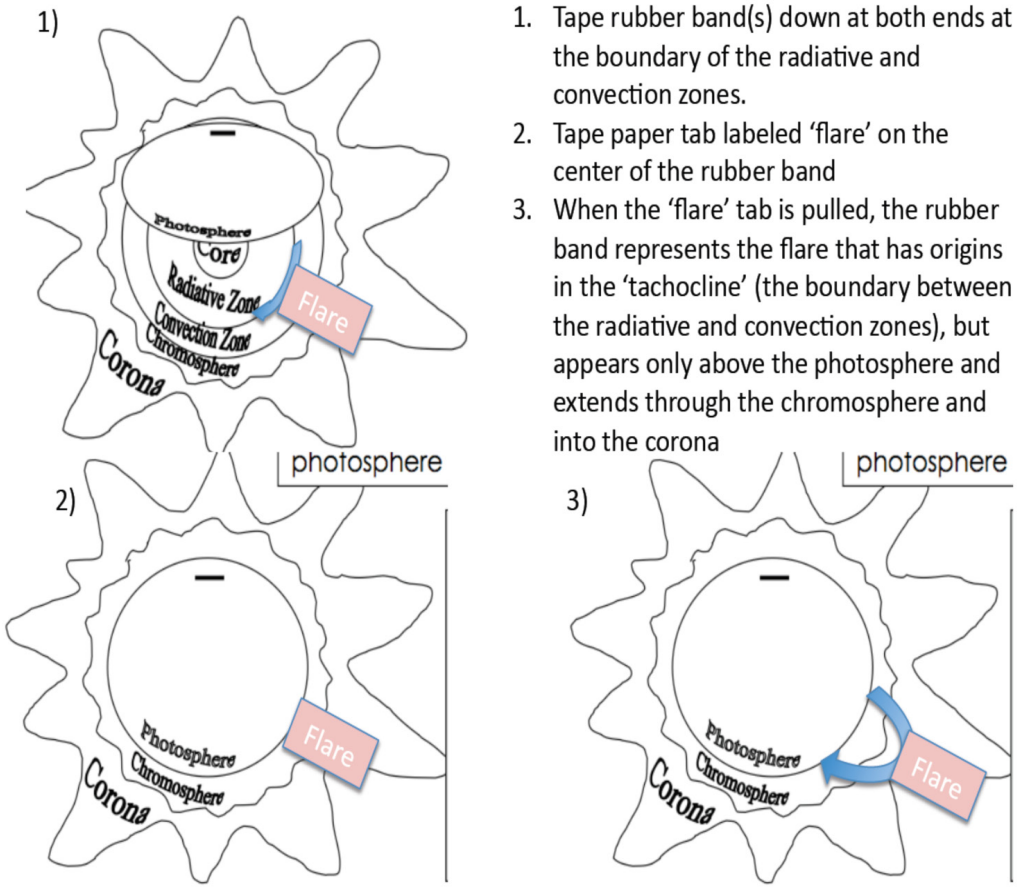
For Grades 9–12

NASA's Solar Dynamics Observatory website — *http://sdo.gsfc.nasa.gov*

NASA's Hinode Mission to the Sun — *http://www.nasa.gov/mission_pages/hinode/index.html*

Model of solar flare.

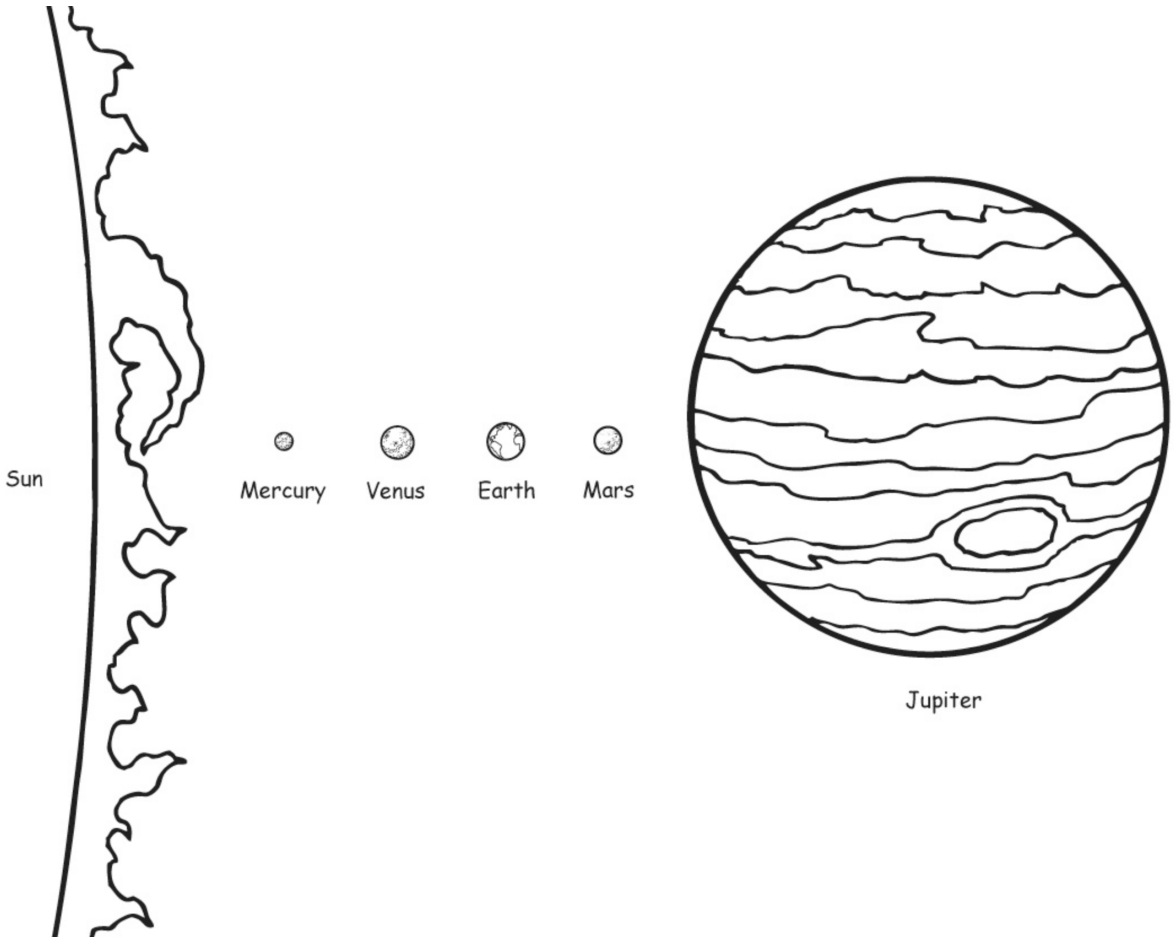
1 per student



1. Tape rubber band(s) down at both ends at the boundary of the radiative and convection zones.
2. Tape paper tab labeled 'flare' on the center of the rubber band
3. When the 'flare' tab is pulled, the rubber band represents the flare that has origins in the 'tachocline' (the boundary between the radiative and convection zones), but appears only above the photosphere and extends through the chromosphere and into the corona

Planet Comparison Chart (1 of 2 pages)

1 per student



Color Guide

Sun — Yellow

Mercury — Light gray

Venus — Pale brown

Earth — Blue and green

Mars — Reddish brown

Jupiter — Brown & white bands with a large "Great Red Spot"

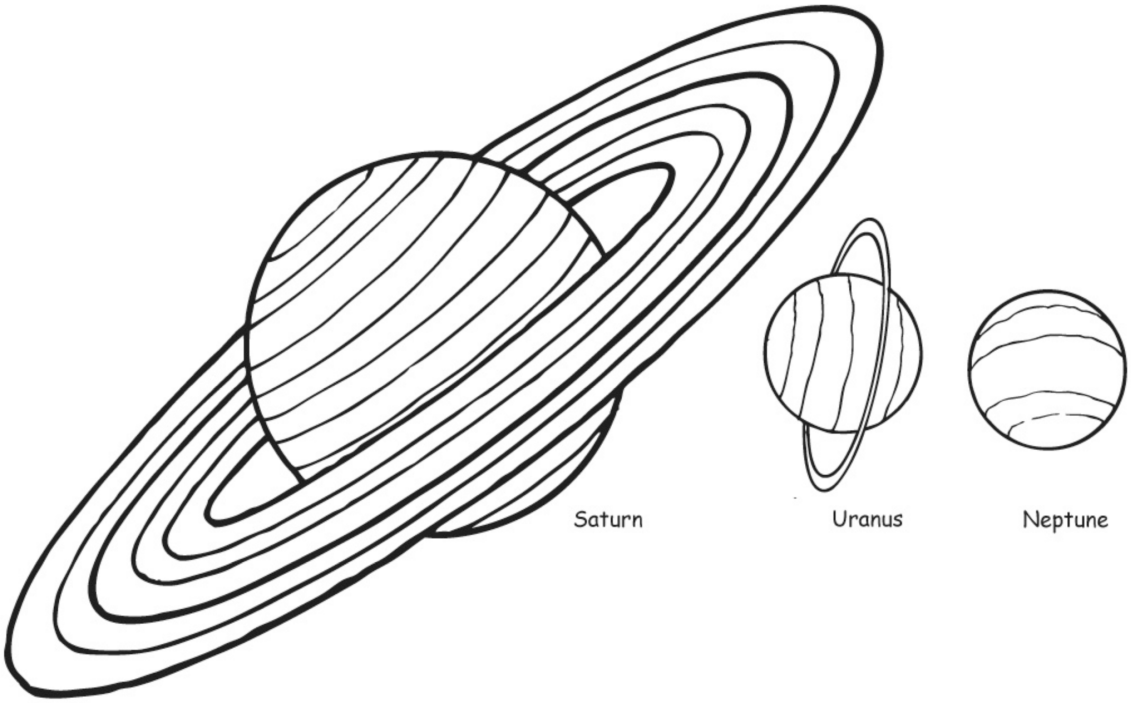
Saturn — Pale yellow and light brown bands, pale beige rings

Uranus — Light blue-green

Neptune — Blue

Planet Comparison Chart (2 of 2 pages)

1 per student



LESSON 2

So — What Is a Planet?

Activity 3 — Do This!

Activity Time
45 minutes

Math Time! Big, Bigger, Biggest!

Introduction for Teachers

Let's explore symbols to learn about size comparisons of the planets! Students use symbols to learn the principles of addition, an important building block for algebra and other mathematical pursuits. Students will learn to use symbols such as "=" to mean "the same as" rather than "the answer to," and use the different sizes of the planets to learn how to draw objects in the solar system to scale in relation to other objects.

Intended Curriculum

Big Idea

Learning about the Sun and the planets as a "treasure map" through the eyes of Scientist–Treasure Hunter, Dr. Phil Chamberlin.

Math Objectives

Students will:

- Write mathematical sentences using comparative symbols.

Language Arts Objectives

Students will:

- Discuss the similarities and differences between the planets and a model of the planets.
- Use accurate language to orally communicate their scientific understanding.

Materials and Teacher Preparation

Materials

- Planet Comparison Chart (in black and white) found in Resource Materials
- Math Symbols Sheet (in black and white) found in Resource Materials
- Colored pencils or crayons
- Scissors
- Science Notebooks
- Science Word Wall Chart

Teacher Preparation

Make copies of the Planet Comparison Chart and the Math Symbols sheet (one for each student). Have other materials ready.

Lesson Procedure

- Pass out the Planet Comparison Chart and discuss it with the students. Discuss scale comparison and relative sizes of the planets to each other.
- Start with the four inner planets, naming them and reviewing that these are called "rocky planets."
- Then move to the outer planets, naming them and review that these are called "gas giants." Compare and contrast the sizes of the rocky planets with the gas giants
- Pass out Math Symbols sheet and scissors to each student. Have students cut on the dotted lines to separate the planets and the math symbols.
- Model how to use math symbols with the different-sized planets. Put a planet image and a symbol (<, >, or =) on the board. Then direct students to complete the equation with a different planet image. For example:

- Direct students to work in pairs to practice pictures and symbols.
- Direct students to record math symbols in their notebook comparing the planets. Discuss the concepts of "greater than," "less than," and "equal to."
- Students can write sentences using the math symbols to write about what they see — for example, "The size of Mars is less than the size of Saturn."

Science Notebooks

Let's Begin Our Notebook Activity

Using the Planet Comparison Chart, direct students to write equations in their notebooks.

Science Word Wall

map, size, shape, model, compare, contrast, less than, greater than, equal to

Making Meaning

Have students refer to their notebooks. Discussion:

- What do equations mean? How are they important in terms of the planets?
- What are the four "rocky" planets? What are the four "gas giant" planets?
- How is math important for scientists to know about the planets?

Have students share their notebooks and the words, phrases, sentences, and pictures they use to describe the planets in their notebooks.

Acknowledgments

Dr. Phil Chamberlin, NASA's Goddard Space Flight Center —
http://www.nasa.gov/centers/goddard/home/index.html

Chabot Space and Science Center —
http://www.chabotspace.org/

Further Exploration

NASA's Solar System Exploration website (all about planets) —
http://solarsystem.nasa.gov/planets/index.cfm

NASA's "What Is a Planet?" lithograph —
http:// www.nasa.gov/audience/foreducators/topnav/materials/listbytype/What_Is_a_Planet_Lithograph.html

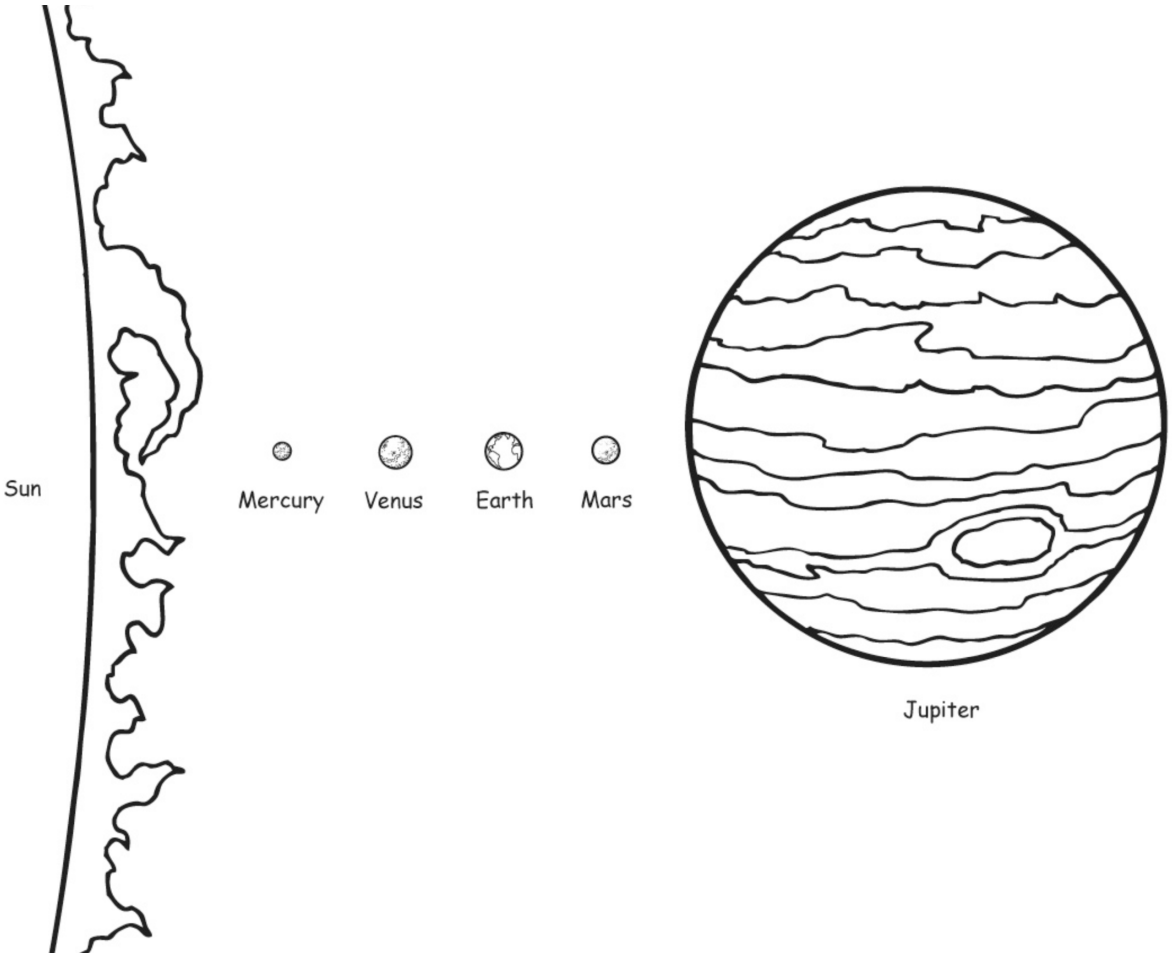
For Grades 9–12

NASA's Solar Dynamics Observatory website —
http://sdo.gsfc.nasa.gov

NASA's Hinode Mission to the Sun —
http://www.nasa.gov/mission_pages/hinode/index.html

Planet Comparison Chart (1 of 2 pages)

1 per student



Color Guide

Sun — Yellow

Mercury — Light gray

Venus — Pale brown

Earth — Blue and green

Mars — Reddish brown

Jupiter — Brown & white bands with a large "Great Red Spot"

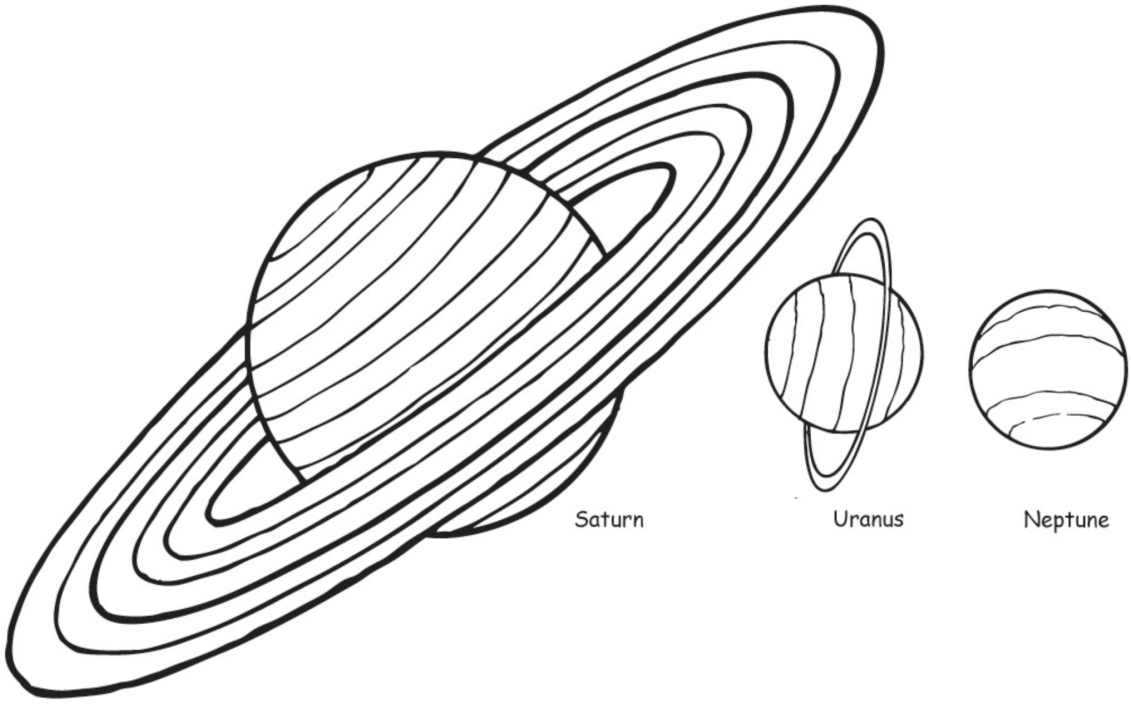
Saturn — Pale yellow and light brown bands, pale beige rings

Uranus — Light blue-green

Neptune — Blue

Planet Comparison Chart (2 of 2 pages)

1 per student



Math Symbols
Sheet to cut out

1 per student

MATH SYMBOLS

< Less Than

> Greater Than

= Equal To

MATH SYMBOLS

< Less Than

> Greater Than

= Equal To

MATH SYMBOLS

< Less Than

> Greater Than

= Equal To

MATH SYMBOLS

< Less Than

> Greater Than

= Equal To

LESSON 2

So — What Is a Planet?

Activity 4 — Read All About it!

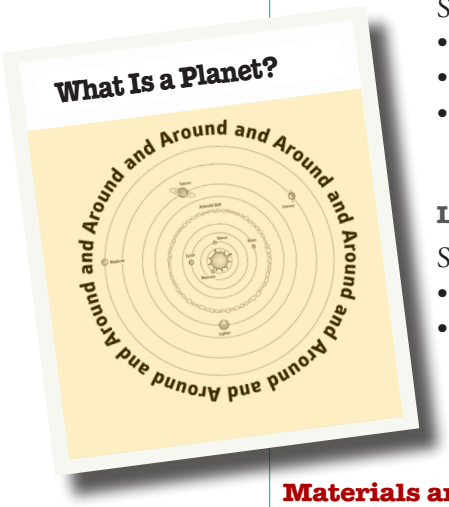
Activity Time
30 minutes

What Is a Planet?

Intended Curriculum

Big Idea

Learning about the Sun and the planets as a "treasure map" through the eyes of Scientist–Treasure Hunter, Dr. Phil Chamberlin.



Science Objectives

Students will:

- Learn that there are four rocky planets and four gas planets.
- Learn that planets are spheres orbiting the Sun.
- Learn that a planet has to be big enough and strong enough (enough gravity) to clear smaller objects out of its way.

Language Arts Objectives

Students will:

- Learn to read and understand expository text.
- Use accurate language to communicate their scientific understanding orally and in writing.

Materials and Teacher Preparation

Materials

- A copy of "Round and Round — What Is a Planet?" reader for each student
- Science Notebooks
- Solar System Folder for each student
- Science Word Wall Chart

Teacher Preparation

- Make copies of the "Around and Around — What Is a Planet?" reader for each student. Have other materials ready.

Lesson Procedure

- Distribute a reader to each student and read it aloud.
- Explain key terms like sphere, planet, orbit, rocky planets and gas giants, and how Dr. Chamberlin might define these terms.

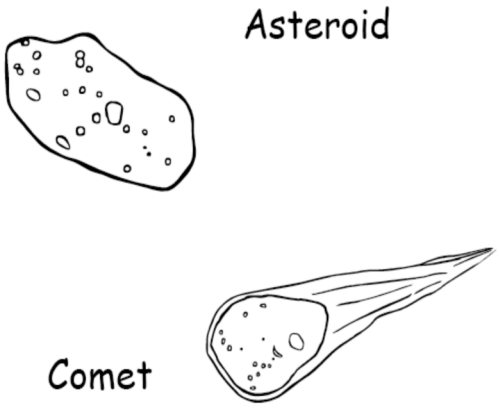
What Is a Planet? reader.
(3 pages)

1 per student

Round and Round — What Is a Planet?

Ball = Sphere

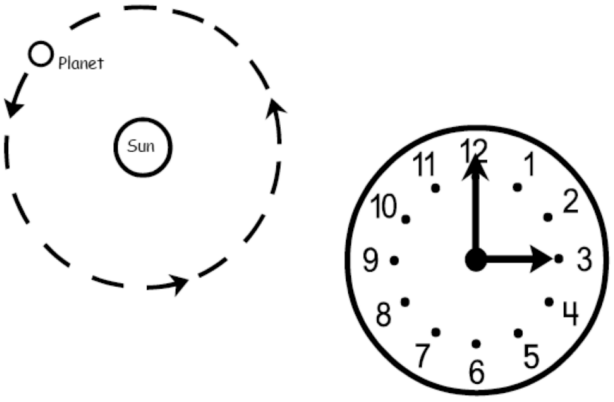
Scientists said, "A planet has to be round." When dust, rock and gases collect together in space and form a ball, this round shape is called a sphere. Planets are spheres. Comets, and most asteroids, are not spheres.



Many objects in space are irregular shapes.

Around and Around the Sun

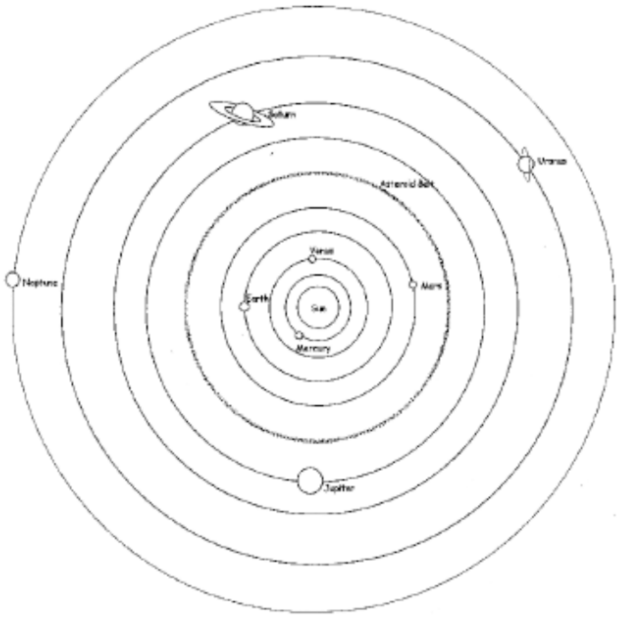
In studying the Sun, Dr. Chamberlin knows that the planets go around the Sun. Planets must orbit the Sun in an orbit that is almost as round as a circle. They move in the opposite direction that the hands of a clock move. Scientists say that planets are round objects, or spheres, circling the Sun.



Planets must go around the Sun in the opposite direction of the hands of a clock. What direction do the clock hands move?

Big Enough, Strong Enough

Scientists decided that one more thing had to be true if the object could be called a planet. It "has cleared the neighborhood around its orbit." What could that mean? It means that the planet has to be big enough and strong enough (enough gravity) to clear away any smaller objects, like asteroids, that are in its orbital path.



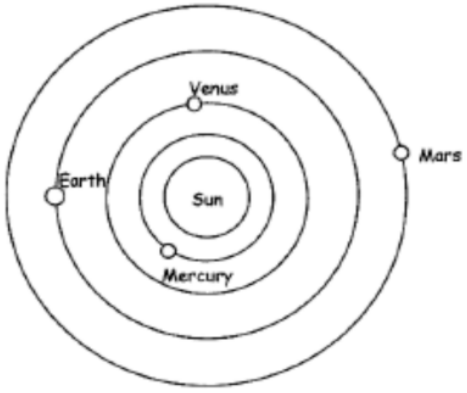
Our solar system and its planets.

Pluto used to be the ninth planet in our solar system. But, it does not have a "clear" neighborhood. It has smaller objects in its orbital path. So, now we have eight planets, not nine — Pluto is now called a dwarf planet. It is just too small to clear its orbit. Can you name the planets?

Pluto has smaller objects in its orbital path.

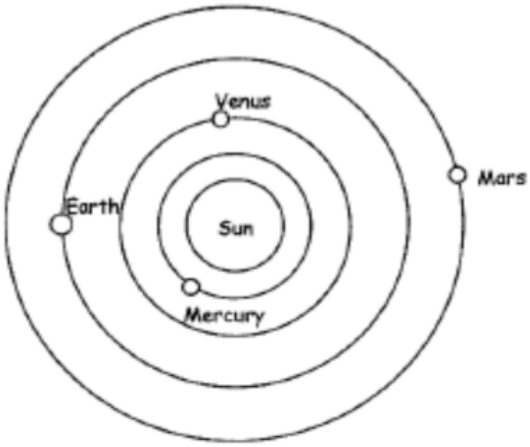
Different Sizes

Our eight planets are alike in some ways, but different in other ways. One of the ways the planets are different are their sizes. The four planets that are closest to the Sun — Mercury, Venus, Earth and Mars — are very small. Did you know Earth was small?



Mercury, Venus, Earth and Mars are the small rocky planets. They are closest to the Sun.

The four planets that are farthest from the Sun — Jupiter, Saturn, Uranus and Neptune — are huge. The small planets are the rocky planets. The large planets are gas planets. But all the planets are round and all the planets circle the Sun in clear orbits!



The four large gas planets are Jupiter, Saturn, Uranus and Neptune.

LESSON 2

So — What Is a Planet?

Activity 5 — Your Story!

Activity Time
45 minutes

Write the Story!

Introduction for Teachers

What have your students learned about the eight planets in our solar system? Help your students write a compare and contrast essay. What is the most amazing thing your students have learned about the planets? Students can use their science notebooks to write about what they now understand about the planets, based on their own observations and thinking about the different activities from this lesson.

Intended Curriculum

Big Idea

Learning about the Sun and the planets as a "treasure map" through the eyes of Scientist–Treasure Hunter Dr. Phil Chamberlin.

Science Objectives

Students will:

- Synthesize all the scientific information they have learned about the planets through the eyes of Dr. Phil Chamberlin.

Language Arts Objectives

Students will:

- Read and understand information.
- Reflect on and recognize their own learning through notebooks.
- Use accurate language to communicate their scientific understanding orally and in writing.

Materials and Teacher Preparation

Materials

- "Round and Round — What Is a Planet?" reader for each student
- Pencils
- Science Notebooks
- Solar System Folder for each student
- Science Word Wall Chart

Lesson Procedure

- Hand out copies of "Round and Round — What Is a Planet?" reader to each student.
- Select students to re-read "Round and Round — What Is a Planet?" aloud to the rest of the class.

Science Notebooks

Let's Begin Our Notebook Activity

Science notebooks are important to being a good scientist, because they help you remember what you see and observe, and what you want to know. As you learn new things, you can add them to your notebook.

Direct students to go back to the first page of their notebooks.

- You are a scientist and you have been asked to make a presentation at a science conference. Your topic is the solar system and the planets. We are going to make presentations like scientists — just like Dr. Chamberlin does when he goes to a meeting. So, we will write notes to help us remember what to tell our audience and will use our model to help them understand our presentation.
- What do you think about when you look up at the sky? What do you think a planet is?

Direct students to go to the last page of their notebooks.

- What do you know about Dr. Chamberlin and the planets?
- What are some new things you have learned about the planets?
- What are some things you have learned about planets and their place in the solar system?

Teacher Post-Assessment Evaluation

Concepts taught in this lesson can be used to create rubrics through evaluating student writing and comprehension through their notebooks.

Use the student writing and discussion to assess the extent to which they accurately observed and understood key concepts about the planets through the eyes of Scientist and Treasure Hunter, Dr. Phil Chamberlin.

Key Concepts

- Planets are spheres.
- Planets have different sizes, and math can help to describe them.
- Planets orbit our nearest star, the Sun.
- Planets clear their orbital path or neighborhood.
- Planets orbit the Sun in a counterclockwise motion.
- The planets' orbits are nearly circular.
- There are eight planets, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- The four small rocky inner planets are Mercury, Venus, Earth and Mars.
- The four giant gas outer planets are Jupiter, Saturn, Uranus and Neptune.
- Pluto is now considered a dwarf planet.